

Fig. 1

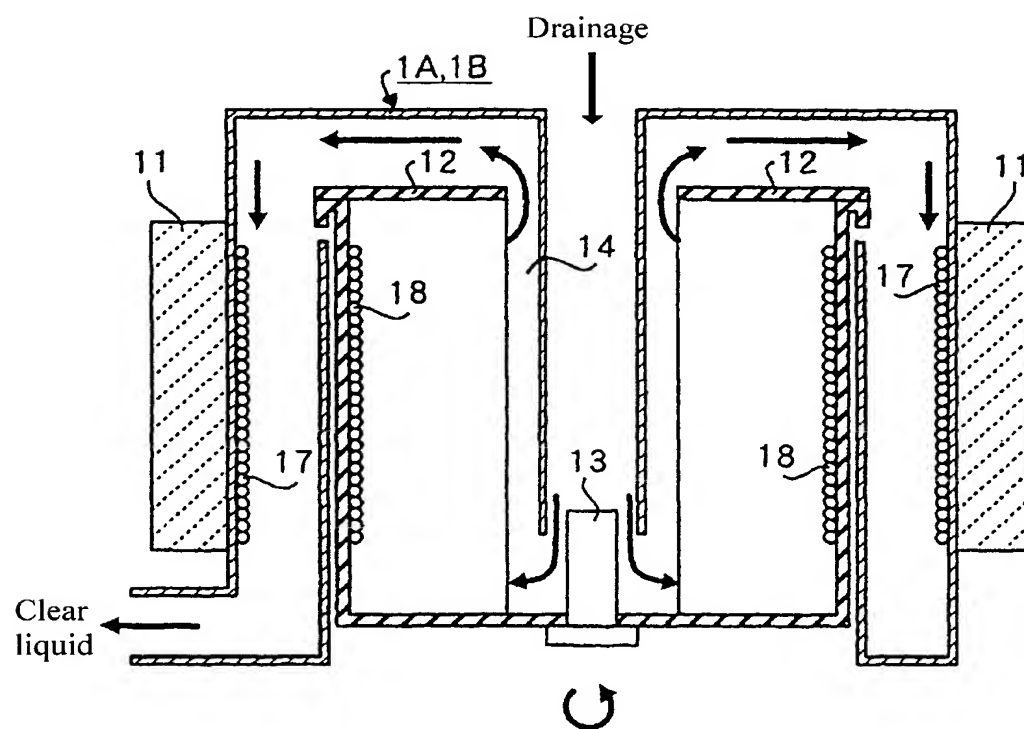


Fig. 2

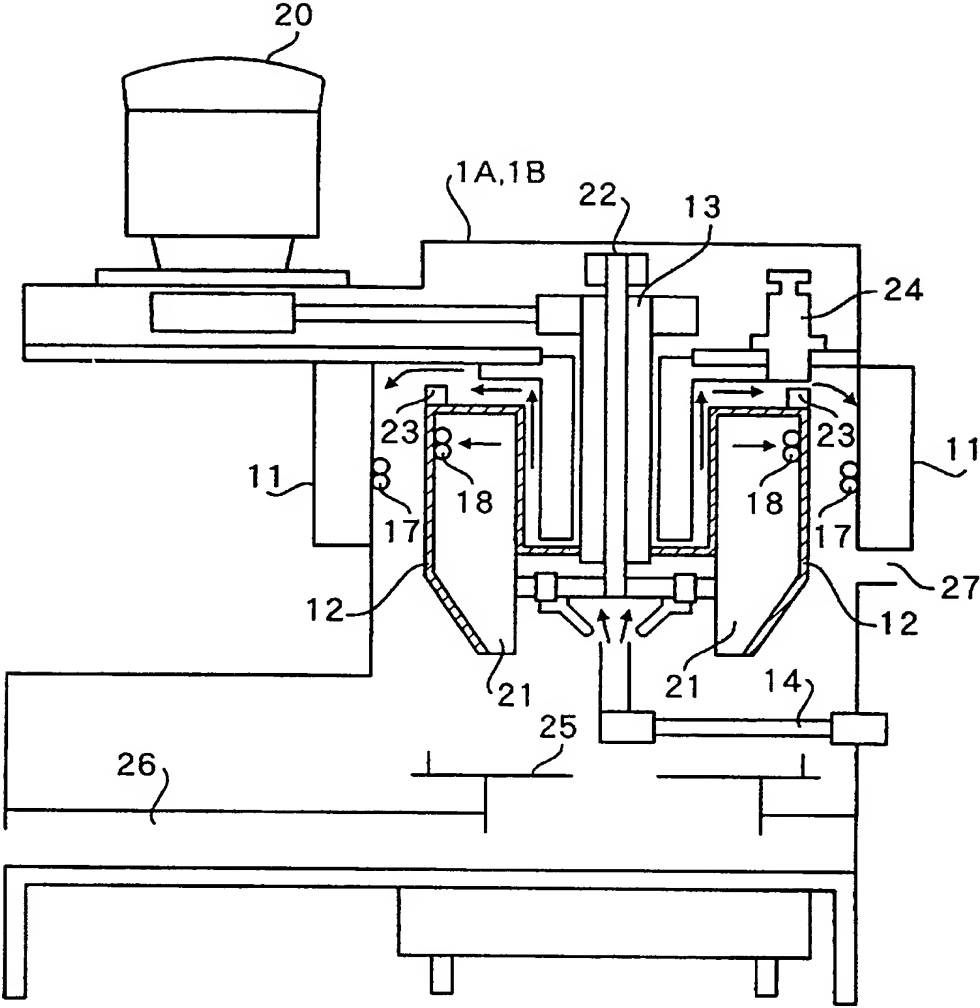


Fig.3 (A)

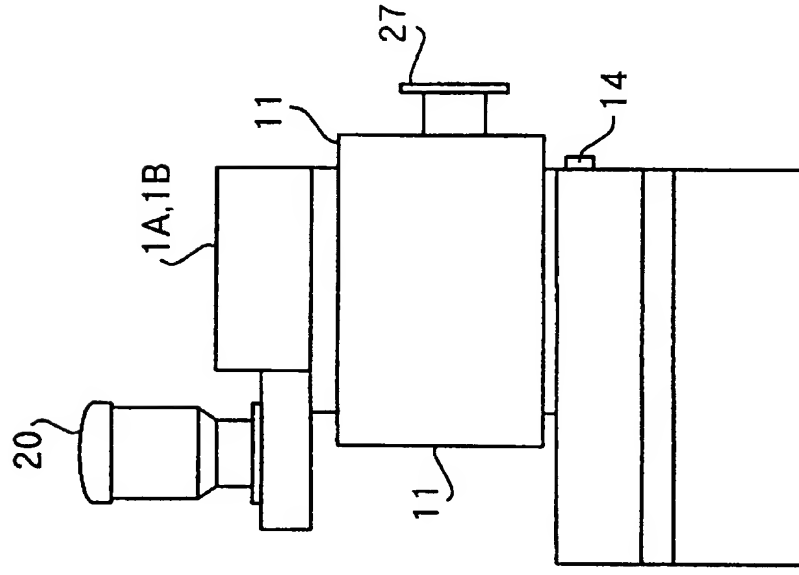


Fig.3 (B)

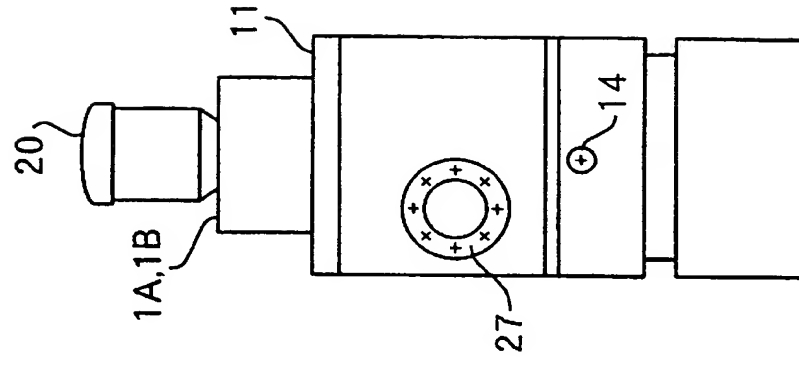


Fig.4

Classification	Fe	Mn	Cd	Pb	Cu	Zn
Pre-treatment drainage (mg/L)	5.3	14.0	0.098	0.037	1.2	1.5
Post-treated drainage (mg/L)	0.4	0.2	0.006	0.002	0.02	0.02
Separation (%)	92	98	93	94	98	98

Fig.5

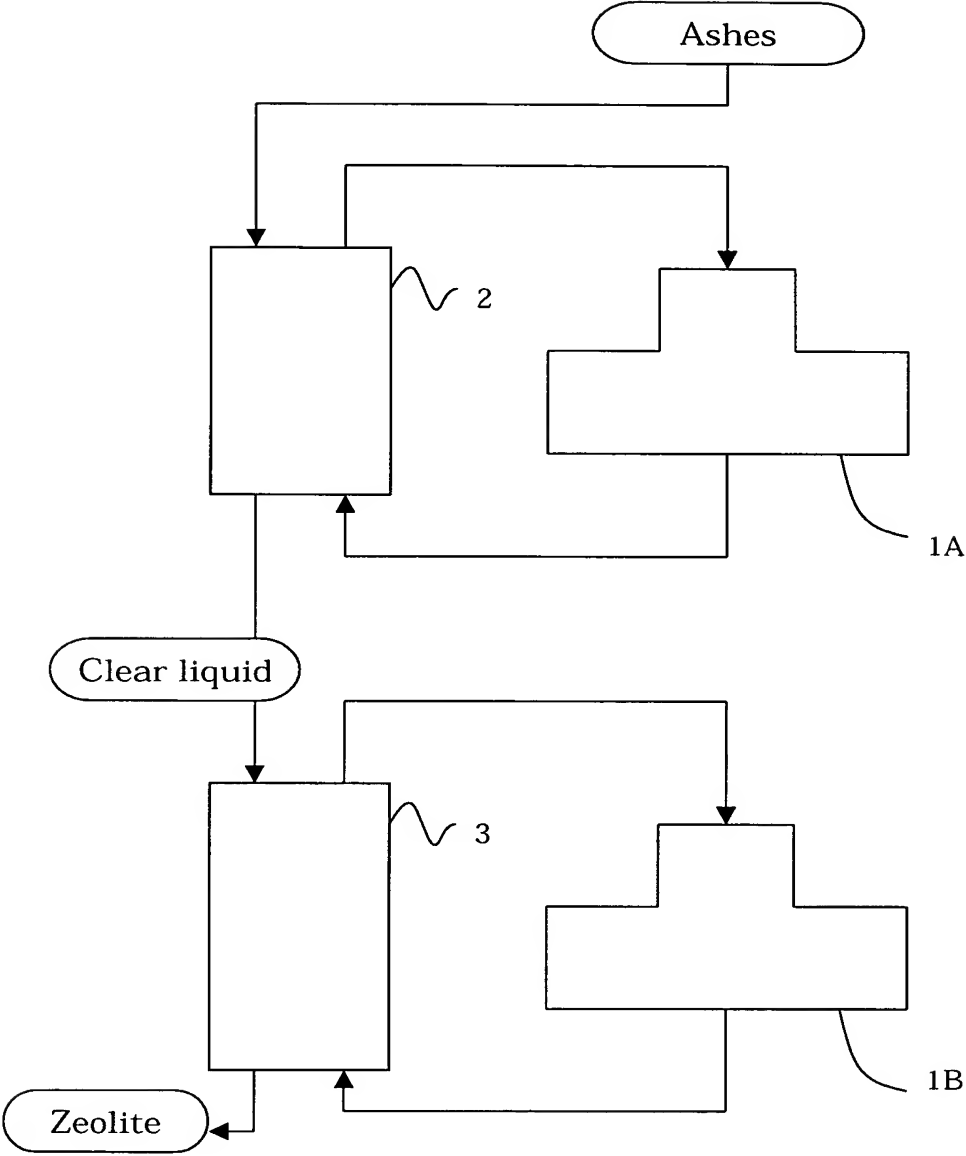


Fig.6

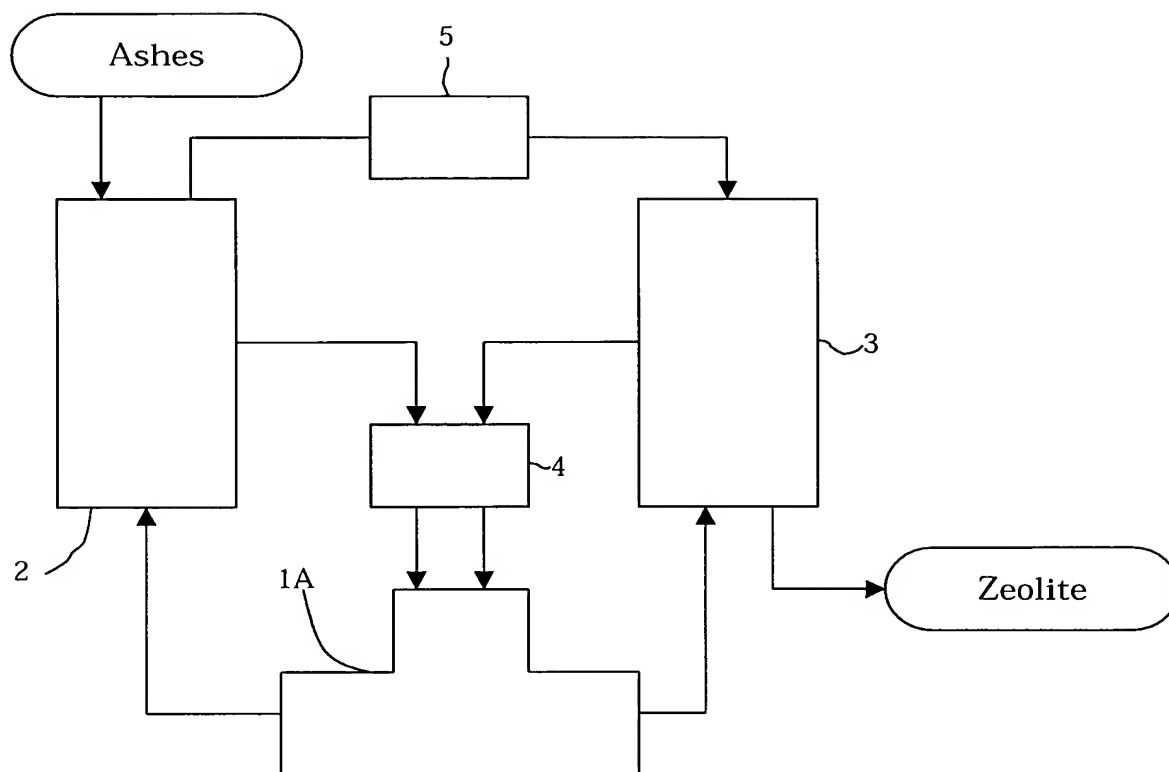


Figure 7. Pretreatment Drainage

Item	Results of Measurement	Measurement Method	Drainage Reference Value
Water Temperature (°C)	16 (°C)		
SS	49 (mg/l)	As in Exhibit 8 of Official Notice No. 59 of Ministry of the Environment	60
n-Hex Extracted substances	2.6 (mg/l)	As in Exhibit 4 of Official Notice No. 64 of Ministry of the Environment	5 (30)
(T-N) Total nitrogen	510 (mg/l)	JIS K 0102 45.2	
(T-P) Total phosphorus	2.3 (mg/l)	JIS K 0102 46.3	
(Cd) Cadmium	24 (mg/l)	JIS K 0102 55-2	0.1
(Pb) Lead	180 (mg/l)	JIS K 0102 54-2	0.1
(6-Cr) Chromium (VI)	less than 0.05 (mg/l)	JIS K 0102 65-2	0.5
(As) Arsenic	0.07 (mg/l)	JIS K 0102 61-2	0.1
(T-CN) Total cyanogen	0.4 (mg/l)	JIS K 0102 38-2	1
(T-Hg) Total mercury	0.18 (mg/l)	As in Exhibit 1 of Official Notice No. 59 of Ministry of the Environment	0.005
PCBs	less than 0.0005 (mg/l)	As in Exhibit 3 of Official Notice No. 59 of Ministry of the Environment	0.003
Trichloroethylene	less than 0.001 (mg/l)	JIS K 0125 5.2	0.3
Tetrachloroethylene	less than 0.001 (mg/l)	JIS K 0125 5.2	0.1
1,1,1-trichloroethane	less than 0.001 (mg/l)	JIS K 0125 5.2	3.0
Dichloromethane	less than 0.001 (mg/l)	JIS K 0125 5.2	0.2
Carbon tetrachloride	less than 0.001 (mg/l)	JIS K 0125 5.2	0.02
(Se) Selenium	less than 0.12 (mg/l)	JIS K 0102 67.2	0.1
1,2-dichloroethane	less than 0.001 (mg/l)	JIS K 0125 5.2	0.04
1,1-dichloroethylene	less than 0.001 (mg/l)	JIS K 0125 5.2	0.2
cis-1,2-dichloroethylene	less than 0.001 (mg/l)	JIS K 0125 5.2	0.4
1,1,2-trichloroethane	less than 0.001 (mg/l)	JIS K 0125 5.2	0.06
1,3-dichloropropene	less than 0.001 (mg/l)	JIS K 0125 5.2	0.02
Benzene	0.13 (mg/l)	JIS K 0125 5.2	0.1
Thiram	less than 0.001 (mg/l)	Solid-phase extraction HPLC	0.06
Simazine	less than 0.001 (mg/l)	Solid-phase extraction GC/MS	0.03
Thiobencarb	less than 0.001 (mg/l)	Solid-phase extraction GC/MS	0.2
(F) Fluorine	310 (mg/l)	JIS K 0102 34.2	15
(DXNs) Dioxins	1800 (Pg-TEQ/l)	JIS K 0312 (1999)	10

Figure 8. Post-Treatment Drainage

Item	Results of Measurement	Measurement Method	Drainage Reference Value
Water Temperature (°C)	17 (°C)		
SS	21 (mg/l)	As in Exhibit 8 of Official Notice No. 59 of Ministry of the Environment	60
n-Hex Extracted substances	1.1 (mg/l)	As in Exhibit 4 of Official Notice No. 64 of Ministry of the Environment	5 (30)
(T-N) Total nitrogen	570 (mg/l)	JIS K 0102 45.2	120 (60)
(T-P) Total phosphorus	0.04 (mg/l)	JIS K 0102 46.3	
(Cd) Cadmium	14 (mg/l)	JIS K 0102 55-2	0.1
(Pb) Lead	less than 0.01 (mg/l)	JIS K 0102 54-2	0.1
(6-Cr) Chromium (VI)	less than 0.05 (mg/l)	JIS K 0102 65-2	0.5
(As) Arsenic	less than 0.01 (mg/l)	JIS K 0102 61-2	0.1
(T-CN) Total cyanogen	less than 0.1 (mg/l)	JIS K 0102 38-2	1
(T-Hg) Total mercury	less than 0.0005 (mg/l)	As in Exhibit 1 of Official Notice No. 59 of Ministry of the Environment	0.005
PCBs	less than 0.0005 (mg/l)	As in Exhibit 3 of Official Notice No. 59 of Ministry of the Environment	0.003
Trichloroethylene	0.002 (mg/l)	JIS K 0125 5.2	0.3
Tetrachloroethylene	less than 0.001 (mg/l)	JIS K 0125 5.2	0.1
1,1,1-trichloroethane	less than 0.001 (mg/l)	JIS K 0125 5.2	3.0
Dichloromethane	less than 0.001 (mg/l)	JIS K 0125 5.2	0.2
Carbon tetrachloride	less than 0.001 (mg/l)	JIS K 0125 5.2	0.02
(Se) Selenium	less than 0.01 (mg/l)	JIS K 0102 67.2	0.1
1,2-dichloroethane	less than 0.001 (mg/l)	JIS K 0125 5.2	0.04
1,1-dichloroethylene	less than 0.001 (mg/l)	JIS K 0125 5.2	0.2
cis-1,2-dichloroethylene	less than 0.001 (mg/l)	JIS K 0125 5.2	0.4
1,1,2-trichloroethane	less than 0.001 (mg/l)	JIS K 0125 5.2	0.06
1,3-dichloropropene	less than 0.001 (mg/l)	JIS K 0125 5.2	0.02
Benzene	less than 0.001 (mg/l)	JIS K 0125 5.2	0.1
Thiram	less than 0.001 (mg/l)	Solid-phase extraction HPLC	0.06
Simazine	less than 0.001 (mg/l)	Solid-phase extraction GC/MS	0.03
Thiobencarb	less than 0.001 (mg/l)	Solid-phase extraction GC/MS	0.2
(F) Fluorine	7.5 (mg/l)	JIS K 0102 34.2	15
(DXNs) Dioxins	0.58 (Pg-TEQ/l)	JIS K 0312 (1999)	10



Fig.9 (A)



Fig.9 (B)

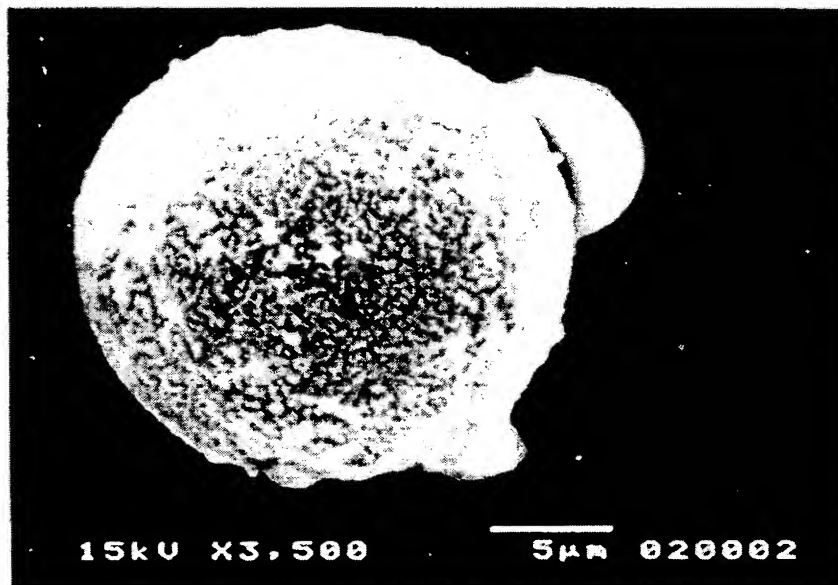


Fig.10

	A Method	High-Temperature and High-Pressure Autoclave Method	Superconductive Non-Liquid-Cooling-Type Magnet Method of the Present Invention
Basic Method	A boiling non-pressure method	A high-temperature and high-pressure batch method	A method for continuously treating electrolytic water with a superconductive high-magnetic force
Ratio of Solids to Liquid	1:5 (coal ash) : (NaOH liquid)	1:3	1:3
Method for Separating Solids from Liquid	Filter press	Filter press or decanter, or a centrifugal separator	Ring-tube method
Concentration of NaOH	2N	3.5N	2N
Reaction Time	6H	3H-4H	1-2 minutes
Pressure	1 kg / cm <sup>2</sup> (normal atmospheric pressure)	8 kg / cm <sup>2</sup>	1 kg / cm <sup>2</sup> (normal atmospheric pressure)
Temperature	98°C	174°C	100°C-150°C
Production Capacity/H	1.5 tons / H	1/3 of capacity of an autoclave / 3H-4 H	The required volume can be produced continuously.
Pretreatment	No	No	Pretreatment with inorganic acids or organic acids, when necessary
Heat Source	Electricity and dry vapor	Electricity and dry vapor	Electricity
Heating Efficiency	Not good	Not good (because of the large capacity of the autoclave)	Very good (because an autoclave method is not used)

Fig.11

Facility	Date of Installation	Manufacturing Method	Planned Annual Production	Substance(s)
A	Assistance activity in 1989 (NEDO) Installed in 1990	A boiling non-pressure open type (100°C, normal atmospheric pressure)	750 tons	Fly ash of coal ash
B	May 1998	Saturated-vapor autoclave method (174°C, 8 kg / cm <sup>2</sup> )	200 tons	Incinerated ash of telephone directories, and pulp sludge
C	June 1999	Same as above	200 tons	Fly ash of coal ash, and aluminum sludge
D	November 2000	Same as above	200 tons	Fly ash of coal ash, and aluminum sludge
E	April 2001	Same as above	200 tons	Natural pearlite
F	June 2001	Same as above	150 tons	Fly ash of coal ash